

Notice of Allowability

Application No.

10/821,430

Examiner

Shane M. Thomas

Applicant(s)

CYPHER, ROBERT E.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7/30/07.
2. ☒ The allowed claim(s) is/are 1-3,6,8-13,15-19,22,24-29,31 and 32 (renumbered 1-24).
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 7/16/2007
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Stephan J. Curran (Reg. No. 50,6664) on 8/22/2007.

The claims of the application have been amended as follows:

1. A mechanism for filtering snoop requests to a cache memory, said mechanism comprising:
 - a first storage including a first plurality of entries configured to store corresponding first snoop filter indications;
 - a second storage including a second plurality of entries configured to store second snoop filter indications; and
 - a cache controller configured to receive a transaction request including an address and to generate an index for accessing said first storage by performing a hash function on said address; wherein, said cache controller is further configured to selectively generate a snoop operation to said cache memory for said transaction request dependent upon a snoop filter indication stored in said first storage that corresponds to said address;
 - wherein during a first mode of operation and in response to a cache memory access, said cache controller is configured to store said snoop filter indication in an entry of said first storage having an index equal to the hash value of an address associated with said cache line; and

wherein during said first mode of operation, said cache controller is further configured to populate given entries of said second storage with said second snoop filter indications based on entries contained in said cache memory.

2. The mechanism as recited in claim 1, wherein said cache controller is configured to generate said snoop operation to said cache memory for said transaction request if said snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request was stored within said cache memory.

3. The mechanism as recited in claim 1, wherein said cache controller is configured to ignore said transaction request if said snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request is not stored within said cache memory.

6. The mechanism as recited in claim 1, wherein during a second mode of operation, said cache controller is further configured to selectively generate a snoop operation to said cache memory for said transaction request dependent upon a second snoop filter indication stored in said second storage that corresponds to said address of said transaction request.

8. The mechanism as recited in claim 6, wherein during said second mode of operation, said cache controller is configured to read a respective address of each entry in said cache memory, to generate an index associated with said respective address and to store a corresponding second

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snoop filter indication within each entry of said second storage corresponding to said index associated with said respective address.

9. The mechanism as recited in claim 1, wherein said cache controller is further configured to populate given entries of said second storage in response to said first storage having a predetermined number of said first plurality of entries populated with said first snoop filter indications.

11. The mechanism as recited in claim 6, wherein during said second mode of operation, said cache controller is further configured to generate a snoop operation to said cache memory for said transaction request if said given second snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request was stored within said cache memory.

12. The mechanism as recited in claim 6, wherein said cache controller is configured to ignore said transaction request if said given second snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request is not stored within said cache memory.

13. The mechanism as recited in claim 1, wherein during said second mode of operation, said cache controller is configured to initialize each of said first plurality of entries of said first storage to an initialization value.

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17. A method of filtering snoop requests to a cache memory, said method comprising:

storing corresponding first snoop filter indications within a first plurality of entries of a first storage;

storing second snoop filter indications within a second plurality of entries of a second storage;

receiving a transaction request including an address and generating an index for accessing said first storage by performing a hash function on said address;

selectively generating a snoop operation to said cache memory for said transaction request dependent upon a snoop filter indication stored in said first storage that corresponds to said address;

storing said snoop filter indication in an entry of said first storage having an index equal to the hash value of an address associated with said cache line during a first mode of operation and in response to a cache memory access: and

during said first mode of operation, populating given entries of said second storage with said second snoop filter indications based on entries contained in said cache memory.

18. The method as recited in claim 17, further comprising generating said snoop operation to said cache memory for said transaction request if said snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request was stored within said cache memory.

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19. The method as recited in claim 17, further comprising ignoring said transaction request if said snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request is not stored within said cache memory.

22. The method as recited in claim 17, further comprising, during a second mode of operation, selectively generating a snoop operation to said cache memory for said transaction request dependent upon a second snoop filter indication stored in said second storage that corresponds to said address of said transaction request.

24. The method as recited in claim 22, further comprising, during said second mode of operation, reading an respective address of each entry in said cache memory, generating an index associated with said respective address and storing a corresponding second snoop filter indication within each entry of said second storage corresponding to said index associated with said respective address.

25. The method as recited in claim 17, further comprising populating given entries of said second storage in response to said first storage having a predetermined number of said first plurality of entries populated with said first snoop filter indications.

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27. The method as recited in claim 22, further comprising during said second mode of operation, generating a snoop operation to said cache memory for said transaction request if said given second snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request was stored within said cache memory.

28. The method as recited in claim 22, further comprising ignoring said transaction request if said given second snoop filter indication is a value indicative that a cache line corresponding to said address of said transaction request is not stored within said cache memory.

29. The method as recited in claim 17, further comprising initializing each of said first plurality of entries of said first storage to an initialization value during said second mode of operation.

Information Disclosure Statement

The information disclosure statement filed 7/16/2007 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because a date associated with “A Second Look at Bloom Filters” has not been included with the entry (number 4) on the form 1449. To overcome this issue, the Examiner requests that the date displayed on the first page of the reference (e.g. 1983) should be appended to the respective entry on the 1449 in order to be properly considered. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with

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the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane M. Thomas whose telephone number is (571) 272-4188. The examiner can normally be reached on M-F 8:30 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt M. Kim can be reached on (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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